as the product of the difference of two logarithms by the difference of the reciprocal of two coefficients; or as one-half the sum of the squares of the velocities at two points on the upper isobar, minus the sum of the squares of the velocities at two points on the lower isobar, added to the product of gravity by the sum of the heights of the same two points on the upper isobar, minus the heights of the two points on the lower isobar. The pressures P, P_o can be changed into the barometric pressures B, B_o by adding the factor $(1+\eta)$.

We see then that instead of computing the work integral around the circuit by means of the densities as measured by observations *in situ*, the velocities measured by theodolites stationed on the ground are a perfect substitute, and the mode of obtaining the velocities of the motion of the air at four points by triangulation is much easier than by ascensions of any kind. Furthermore, it is not necessary that the upper and the lower point-pairs should lie on the same isobar, for it is equally correct to use any four points, and indeed any number of points joined together in a chain around a circuit in the atmosphere, by combining the velocities and the gravity terms in algebraic succession. Attention is called to the fact that the recent Report of the Chief of the Weather Bureau on the International Cloud Observations contains a large amount of material in proper form for such computations. The twenty subareas of the normal cyclones and anticyclones give at the heights of the designated cloud strata the velocities of motion carefully determined. They are also arranged in vertical lines over each subarea, so that there are 20 vertical gagings through each cyclone and anticyclone, respectively. Also, the data for computing the specific volumes are given in the same connection, and can be employed in check computations. We hope to be able to pay some further attention to the development of this interesting subject.

It is noted that in the course of the integration all the terms depending upon deflecting and centrifugal forces have dropped out. Bjerknes properly stated that these could be neglected. In the final equation, if the integration is around a circuit, the terms in gz will disappear because the sum of the (z) is zero, the involved variations of the products (gz) being too small to have appreciable value. Finally, by 389*a*, page 588, it is seen that the temperature gradients involve the form $(z-z_o)$ as a factor, so that in a circuit this correction practically disappears. There remains only the friction kq, and as this is an insignificant quantity in the air above a thin surface skin, say 500 feet deep, but little will be derived from this term to modify the circulation. On the other hand, turbulent motions and the interplay of mixing minor vortices in all stages of formation may actually introduce a term of significance. These questions, and many more, can be discussed to advantage by the theory of closed circuits. When the integration is not around a circuit the gravity temperature and friction terms must enter the equations. It is also to be remarked that reductions to sea level, or from one height to another in the free air, are not complete when referred to the static term gz alone, as is commonly done in barometry, but the dynamic term $\frac{1}{2}q^2$ should also enter. The United States Weather Bureau is engaged in reconstructing its entire series of barometric observations, taken during the past thirty years, and they are to be reduced to a homogeneous system. It can now be stated that there still remain some small residuals, which may be due to local variations of gravity, or to local variations of the assumed mean temperature of the air column, or to local changes in a constant used for the plateau reductions, or finally they may be due in part to the swirl of local circulations or eddies, all of which the theory under discussion may be used in elucidating. It is an important advance in meteorology to have the problem, as stated by Prof. V. Bjerknes and Dr. Sandström, brought to the attention of students of the dynamics of the atmosphere.

THE PEOPLE OF MARS.

By CHARLES FITZHUGH TALMAN, U. S. Weather Bureau.

The climates of other planets than our own form a subject which will perhaps largely occupy the attention of future meteorologists who, with more efficient means of observation than we now possess, may find in the phenomena of the planetary atmospheres important aid in the elucidation of many obscure phases of their science.

Already, in the study of the planet Mars, certain interesting and seemingly anomalous atmospheric conditions have been observed. The insolation of this planet, per unit of area, is less than half that of the earth. This circumstance would seem to imply a rigorous climate, yet it is almost certain that the average temperature at the Martian surface is somewhat higher than that of our own globe; for otherwise we can hardly account for the small extent of the polar snow-caps which are so important a feature of the planet's topography.

All the evidence points to a similarity between the terrestrial and Martian climates, and this fact leads up to the perennial topic of the planet's inhabitants. Never does there occur a favorable opposition of Mars, that the newspapers do not seize the opportunity to publish more or less fantastic dissertations on this inexhaustible subject, in which the sometimes relatively sober and moderate intention of the writers is completely misinterpreted by extravagant pictures, purporting to be faithful portrayals of the Martians and of the conditions of life on their planet. At the same time hare-brained speculators spring up everywhere prepared to show us exactly how to telegraph across the abyss of space and communicate with the inhabitants of our sister world.

It is strange that no one has ever pointed out how unphilosophical, from a biological point of view, is the question, "Are there people on Mars?"

In the writings of many latter-day litterateurs and not a few professed scientists we find glib references to the people of this or that planet, and the use of these words implies the assumption that life, from its necessarily simple beginnings, has, in each world where it exists, ultimately developed one and only one species more or less like the human race, and clearly differentiated from and superior to all the other species produced in the same world. But nothing that we know of the evolutionary process warrants such an assumption.

The imaginable forms which living matter may assume are infinitely diverse. Look forth upon the myriad species of organic beings—plants and animals—which our own world contains. Where among them all can you find an organism, other than man, which, if placed upon Mars, would be intellectually capable of communicating with us? What success would we have in attempting to telegraph to a race of horses or guinea pigs, for example?

On our own planet the development of life apparently entered, at an early stage, upon two diverse roads. The forms subsequently evolved, though probably of common ancestry, are nevertheless clearly and naturally divided into two great kingdoms, the animal and the vegetal. But there is no reason for supposing that the course of events has been the same in other worlds than ours. For example, it may be that on Mars plant life only exists. Now, suppose that, as the speculators on this subject commonly assume, Mars has supported life longer than the earth. In such a case the plant forms would presumably have reached a high stage of development; plants would there exist compared with which our highest plants, such as daisies and asters, are simple and rudimentary. Nevertheless, it is not conceivable that any plant, however high in the scale, could hold communication with the human race.

However, I think it is most reasonable to suppose that, if life has been produced at all upon other planets than our own, it has assumed forms of which we know nothing; forms which may be neither animal nor vegetal, which transcend our experience, and of which we are therefore quite unable to conceive. Given life, plastic and protean, and the laws of probabilities, and such a result would seem to follow as a matter of course.

Even could we actually perform the journey to Mars, it is not likely that we would be able to communicate with its inhabitants, and if we found existing there a great number of life forms we would probably have difficulty in deciding to which of them, if any, the designation people should be applied.

OBSERVATIONS AT HONOLULU.

Through the kind cooperation of Mr. Curtis J. Lyons, Meteorologist to the Government Survey, the monthly report of meteorological conditions at Honolulu is now made partly in accordance with the new form, No. 1040, and the arrangement of the columns, therefore, differs from those previously published.

Meteorological Observations at Honolulu, December, 1900.

The station is at 21° 18′ N., 157° 50′ W.

Hawaiian standard time is 10h 30m slow of Greenwich time. Honolulu local mean time is 10h 31m slow of Greenwich.

Pressure is corrected for temperature and reduced to sea level, and the gravity correction, —0.06, has been applied.

The average direction and force of the wind and the average cloudiness for the whole day are given unless they have varied more than usual, in which case the extremes are given. The scale of wind force is 0 to 12, or Beaufort scale. Two directions of wind, or values of wind force, or amounts of cloudiness, connected by a dash, indicate change from one to the other.

The rainfall for twenty-four hours is measured at 9 a. m. local, or 7.31 p. m., Greenwich time, on the respective dates.

The rain gage, 8 inches in diameter, is 1 foot above ground. Thermometer, 9 feet above ground. Ground is 43 feet, and the barometer 50 feet above sea level.

Date.	Pressure at sea level.	Temperature.		During twenty-four hours preceding 1 p. m., Greenwich time, or 2.29 a. m., Honolulu time.									Total rainfall at 9 a. m., local time.
				Temperature.		Means.		Wind.		Average cloudiness.	Sea-level pressures.		
		Dry bulb.	Wet bulb.	Maximum.	Minimum.	Dew-point.	Relative humidity.	Prevailing direction.	Force.		Maximum.	Minimum.	
	*	†	†			‡	‡		§				
1	29.89	73	71	80	69	66.0	73	ne.	2	1	29.97	29.85	0.02
2	29.86	70	68	80	71	68.0	79	e-ne.	2	7	29.95	29.84	0.00
3	29.89	67	65	80	69	66.3	75	ne.	3-1	5-2	29.91	29.83	0.00
4	29.88	66	64	80	67	65.7	79	ne.	1	1	29.95	29.83	0.00
5	29.91	73	67.5	81	65	66.5	80	sw-n.	1-0	1-3	29.93	29.83	0.08
6	29.97	72	68	78	71	66.5	78	nne-ne.	3	5	30.00	29.90	0.63
7	29.99	72	67	77	70	66.7	81	ne.	3	6	30.02	29.95	0.27
8	29.96	63	61.5	77	70	63.0	72	nne.	3	10-2	30.03	29.92	0.01
9	29.96	70	64.5	78	62	63.5	77	nne.	1	1-7	29.98	29.86	0.00
10	29.94	66	65	76	69	63.3	75	nne.	3-0	3-6	29.98	29.89	0.09
11	29.99	69	67.5	74	66	65.5	87	nne.	2	8	30.00	29.91	0.09
12	30.02	73	67	78	69	66.0	80	nne.	2	7	30.04	29.97	0.03
13	30.04	74	68	79	71	63.7	68	ne.	3	5	30.09	30.03	0.00
14	30.04	73	66	79	73	65.3	70	ne.	2-4	5	30.09	29.99	0.00
15	30.09	74	66.5	79	73	64.0	68	ne.	2-0	2	30.10	30.01	0.00
16	30.07	70	67	80	67	63.7	67	ne.	3-0	3-6	30.13	30.05	0.00
17	30.02	62	60.5	80	69	65.5	77	w-n.	1-0	4-1	30.09	29.99	0.00
18	29.95	61	60.5	79	62	60.5	75	n.	2	1	30.02	29.90	0.00
19	29.95	67	66	78	60	64.3	81	se-sw.	1-0	3	29.98	29.90	0.00
20	30.04	67	64.5	79	67	65.5	77	sw-w.	1-0	2-7	30.07	30.00	0.00
21	30.05	64	62.5	82	66	65.3	79	ne-e.	1-0	2-7	30.07	30.00	0.00
22	29.95	69	67	78	64	63.7	76	ne.	1-0	0-4-0	30.06	29.93	0.02
23	29.89	64	63.5	79	65	65.5	76	nne.	1	6-1-8	29.98	29.86	0.01
24	29.87	73	68.5	79	64	66.3	84	e-sw.	1-0	1-8	29.91	29.83	0.16
25	29.92	69	67	80	70	66.7	77	sw.	3-0	5	29.94	29.84	0.26
26	29.94	70	64.5	78	66	66.5	81	wsw.	1-0	3	29.98	29.90	0.00
27	29.93	69	60.5	75	70	61.7	71	nne.	3-6	2-6	30.01	29.92	0.00
28	29.93	64	57	75	68	56.3	60	nne.	5-4	4-0	29.99	29.89	0.00
29	29.99	59	56	72	62	53.3	61	nne.	3-1	3-0	30.01	29.91	0.00
30	29.98	56	54	73	58	53.7	64	nne.	1-3	6-0	30.06	29.97	0.00
31	29.94	64	58	74	55	53.7	67	nne.	0-3	1	30.05	29.93	0.00
Sums	......	......	......	......	......	......	......	......	......	......	......	......	1.67
Means	29.963	67.8	64.3	77.7	66.4	63.5	74.5	......	1.7	4.2	30.016	29.917	......
Departure	—.005	......	......	......	......	+0.5	—0.8	......	......	......	......	......	—3.00

Mean temperature for December, 1900 (6 + 2 + 9) ÷ 3 = 71.6; normal is 71.5. Mean pressure for December, 1900 (9 + 3) ÷ 2 = 29.965; normal is 29.970.

*This pressure is as recorded at 1 p. m., Greenwich time. †These temperatures are observed at 6 a. m., local, or 4.31 p. m., Greenwich time. ‡These values are the means of (6 + 9 + 2 + 9) ÷ 4. §Beaufort scale.

MEXICAN CLIMATOLOGICAL DATA.

Through the kind cooperation of Señor Manuel E. Pastrana, Director of the Central Meteorologic-Magnetic Observatory, the monthly summaries of Mexican data are now communicated in manuscript, in advance of their publication in the Boletin Mensual. An abstract, translated into English measures, is here given, in continuation of the similar tables published in the MONTHLY WEATHER REVIEW since 1896. The barometric means have not been reduced to standard gravity, but this correction will be given at some future date when the pressures are published on our Chart IV.

Mexican data for December, 1900.

Stations.	Altitude.	Mean barometer.	Temperature.			Relative humidity.	Precipitation.	Prevailing direction.	
			Max.	Min.	Mean.			Wind.	Cloud.
	Feet.	Inch.	°F.	°F.	°F.	%	Inch.		
Chihuahua	4,633	25.48	61.7	26.8	44.2	60	0.02	ne.	....
Leon (Guanajuato)	5,934	24.33	72.3	39.4	54.5	79	2.06	ssw.	sw.
Mazatlan	25	29.96	83.8	60.3	73.2	65	0.18	nw.	....
Mexico (Obs. Cent.)	7,472	23.09	69.8	41.0	52.3	74	4.50	n.	ne.
Morelia (Seminario)	6,401	24.00	70.7	41.0	52.5	81	3.15	sse.	sw.
Saltillo (Col. S. Juan)	5,399	24.81	69.8	33.8	51.8	82	2.38	s.	s.
San Luis Potosi	6,202	24.16	7[illegible].2	37.0	53.4	78	3.20	ne.	....
Tampico	38	29.96	86.0	50.0	65.3	80	3.21	se.	....
Zapotlan (Seminario)	5,078	25.13	75.9	46.4	59.9	74	3.89	sse.	sw.

MONTHLY STATEMENT OF AVERAGE WEATHER CONDITIONS FOR DECEMBER.

By Prof. E. B. GARRIOTT.

The following statements are based on average weather conditions for December, as determined by long series of observations. As the weather of any given December does not conform strictly to the average conditions the statements can not be considered as forecasts:

Settled weather prevails in the tropical regions of the Atlantic and Pacific oceans in December. In the middle latitudes of the North Atlantic, on an average, three storms of marked strength traverse the ocean from the American to the European coasts. These storms follow closely the paths of the transatlantic steamships, and usually occupy three to four days in the passage from Newfoundland to the British Isles. December is one of the months of minimum fog frequency along the transatlantic steamship routes, and icebergs are seldom seen over or near the Banks of Newfoundland.

The severer storms of December average about three a month over the Great Lakes and on the north Atlantic coast of the United States; about two a month on the middle Atlantic coast; and about one a month on the south Atlantic, Gulf, and middle and north Pacific coasts.

December is one of the months of maximum rainfall in the Pacific coast districts of the United States. It is also one of the wet months in the middle and northern Plateau districts. In Arizona and New Mexico the winter precipitation is much lighter than that of the summer months. On the eastern slope of the Rocky Mountains and in the Missouri and upper Mississippi valleys December is one of the driest months of the year. In the Gulf districts the rainfall averages less than that of the summer and fall months. In the Atlantic coast States, the Lake region, and the Ohio Valley the average precipitation for the different months and seasons does not vary greatly.

In December frost may occur in any part of the United States except the extreme southern portion of the Florida Peninsula. During December, January, and February, the trucking districts of the South Atlantic and Gulf States, and the orange groves of Florida and the Gulf coast districts, are